complement activation which appears later during the dialysis session.

Renal function and intrarenal hemodynamics in acutely hypoxic rats. *B. Zillig and B. Truniger. Medizinische Klinik, Kantonsspital, Luzern, Switzerland.* On the basis of microsphere distribution studies, inert gas washout and standard clearance data, the effects of acute hypoxia on intrarenal hemodynamics and renal excretory parameters were studied in anesthetized, mechanically ventilated rats. Moderate hypoxia (ventilation with 15% O_2; mean arterial Po_2, 59 mm Hg) caused a brisk increase in diuresis and natriuresis without changing GFR or filtered sodium load. Due to a decrease in renal vascular resistance (R) from 46.4 to 36.6 mm Hg ml^{-1} min^{-1}, mean renal blood flow stayed constant during hypoxia in spite of a significant drop in mean arterial blood pressure. Hypoxic changes in renal function and vascular resistance were *not* accompanied by significant changes in intrarenal distribution of blood flow (IDBF). In four animals responding to servere hypoxia (10% O_2; mean Po_2, 45 mm Hg) with oliguria/anuria and hypotension, R was the lowest of all groups (28.8 mm Hg ml^{-1} min^{-1}). From these studies we conclude: *1)* In the anesthetized rat, acute hypoxia increases diuresis and natriuresis without changing IDBF. *2)* Hypoxic renal vasodilation persists even in oliguria and anuria. *3)* An increase in tubular sodium rejection and a systemic blood pressure insufficient to sustain glomerular filtration are the two principal opposing mechanisms determining renal excretory function in the anesthetized, acutely hypoxic rat.

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Peptic ulceration in kidney transplantation. *J. Ahonen, B. Eklund, O. Lindfors, B. Kuhlback, and B.L. Lindström. 4th Departments of Surgery and Medicine, University Central Hospital of Helsinki, Finland.* The purpose of the paper is to discuss the yet unsolved problem of gastroduodenal ulceration in connection with clinical renal transplantation. The problem was clearly evident when the results of our first 500 transplantations were analyzed. Gastric or duodenal ulceration was diagnosed in 46 patients during the post-transplantation period (9%). This was often associated with severe complications; hemorrhage was seen in 25 patients (pts), perforation in 7. Twelve pts with bleeding and all with perforation died. Of the bleeders, 8 were operated upon; in 5, partial gastric resection was performed, and 3 died. In three cases, vagotomy was done; one patient died. These results indicate that despite the fact that all the pts were on antacids, the morbidity and mortality in peptic ulceration is unacceptably high. The poor results of treatment of gastroduodenal ulcers stress the need of more effective prophylactic measures in these pts. Pretransplantation gastric surgery cannot solve the problem, as only 50% of the pts exhibited dyspeptic symptoms before the transplantation.

Neuromuscular changes after a successful renal transplantation. *R.E. Ahonen and B. Kock. Department of Neurology, University of Helsinki, and IV Department of Medicine, Helsinki University Central Hospital, Helsinki, Finland.* The aim of this work has been to study the neuromuscular system after a successful renal transplantation. Neurologic status and electrophysiologic recordings were performed on 20 patients. Biopsies of the gastrocnemius muscle were taken from 10 patients. Muscles were examined histologically, histochemically, and by EM. The average duration of hemodialysis before transplantation was 13.9 months. Clinical polyneuropathy was found in 65% and autonomic neuropathy in 30% of the patients. Their symptoms were milder than those of the hemodialysis patients. The MCV of the posterior tibial nerve was normal, and the SCV of the sural nerve had significantly risen compared to that of the hemodialysis patients. The EMG was pathologic only in 40%, normal in 33%, and showed regenerative pattern in 27% of the cases. Muscle pathology was found in 80%, and 50% of the changes were mild. Most of the regenerative findings in neuromuscular system appeared rapidly within two months after the transplantation. Our results support the view that transplantation is an effective treatment if remarkable recovery from neuropathy is expected.

Neuromuscular reactions in uremic patients treated with diet therapy and regular hemodialysis program. *R.E. Ahonen and B. Kock. Department of Neurology, University of Helsinki, and IV Department of Medicine, Helsinki University Central Hospital, Helsinki, Finland.* The reactions of the neuromuscular system and the effects of treatment in uremia were studied by using clinical examination, electron physiology, muscle histology, histochemistry, and electron microscopy. The material consists of 30 patients, 13 of them on diet therapy and 17 on regular hemodialysis. Clinical polyneuropathy was found in 69% and autonomic neuropathy in 31% of those on diet therapy. The MCV of the posterior tibial nerve was normal, and the SCV of the sural nerve was significantly lowered. The EMG was pathologic in 63% of the cases and muscle changes were found in 50% of the biopsies. Of those on regular hemodialysis, 88% had clinical polyneuropathy and 76% had autonomic derangement. The MCV was slightly lowered, and the SCV was significantly lowered. The EMG was pathologic in 60% of the cases, and extensive pathologic muscle changes were observed in 82% of the muscle biopsies. The results indicate that hemodialysis affects autonomic nerves and causes extensive muscular changes.

Minimum steroid requirements in renal transplant patients monitored by urinary fibrin degradation products (FDP) and complement (C3). *J.L. Anderton, L. Fananapazir, and Maureen Eccleston. Renal Unit and Department of Medicine, Western General Hospital, Edinburgh, Scotland, United Kingdom.* The purpose of this study was to define the minimum steroid requirement in patients with well established renal transplants, monitoring rejection by urinary FDP and C3 measurements. Urinary FDP and C3 were measured daily over two years in ten patients who had a renal cadaveric transplant. Steroid therapy was reduced step-wise over an average period of fifty weeks to minimum values (range, 5 to 10 mg; mean, 7.0 mg of prednisone). Three patients developed rejection when taking 7.5 mg of prednisone for 10, 21, and 50 weeks, respectively. In these three patients urinary FDP excretion rose markedly 12, 10, and 8 weeks, respectively, prior to the diagnosis of rejection and had fallen to pre-rejection values by the time any significant changes were observed in renal function. C3 appeared in the urine of two of the three patients who had graft rejection, heralding the diagnosis by 14 and 11 days, respectively. The minimal steroid dosage varied from 0.06 to 0.24 mg of prednisone/kg of body wt (mean, 0.11), and the three patients who rejected did so on doses of 0.10, 0.13, and 0.16 mg/kg. Doses of prednisone less than 10 mg

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A full account of the meeting will appear in the Proceedings of the EDTA by December, 1977. AB Gambro (Sweden) has kindly assisted with the publication of the abstracts. Only those abstracts selected for presentation are included.

per day risk the induction of rejection, depending upon the individual response of the patient.

Accelerated vascular disease following renal transplantation: Effects of allograft serum on human arterial smooth muscle cell growth and low-density lipoprotein metabolism. *J.D. Bagdade, M. Stewart, and J.J. Albers, Department of Medicine, University of Washington, Seattle, Washington, U.S.A.* Despite impressive technologic advances, accelerated cardiovascular disease continues to limit the long-term survival of both renal dialysis and transplant patients. To determine whether serum factors in renal allograft recipients might be atherogenic and contribute to their premature cardiovascular morbidity, human arterial smooth muscle cells (SMC), the proliferation of which is a key event in atherogensis, were grown in tissue culture, and the effects of allograft sera on SMC growth and ability to bind, internalize, and degrade human ^{125} I-low-density lipoprotein (LDL) were studied. Serum (10%) from renal allograft patients caused greater stimulation of SMC growth than serum from either human controls or steroid-treated bronchitics ($P < 0.001$, analysis of variance). The lipid-free serum protein fraction which contained this proliferative effect stimulated SMC growth in a pattern identical to that observed with whole serum from the allograft recipients. In addition, allograft sera significantly increased both the binding and uptake and delayed the degradation of ^{125} I-LDL from control subjects by SMC ($P < 0.01$). Thus, substances present in allograft serum cause SMC's to proliferate and accumulate cholesterol-rich lipid from plasma intracellularly. Since these events characterize all atherosclerotic lesions, these properties of allograft serum may play a role in accelerating vascular disease in transplant patients.

***In vitro* evaluation of polycarbonate membrane for hemodialysis.** *A. Bionda, F. Carmassi, C. Donadio, R. Palla. Clinica Medica II, Università, Pisa, Italy.* Polycarbonate membrane (Pl) permeabilities were tested using a rotating batch dialyzer. The new membranes have shown these properties: thickness, 17 μm; burst stength, 26 cm Hg; ultrafiltration rate, 3.5 ml/hr/mEq/mm Hg. The permeability tests where performed with increasing mol wt substances, comparing the results with those obtained with standard Cuprophane (Cu):

	Mol wt	PI *Pobs cm²/sec·10⁻⁵*	Cu	PI/Cu %
Sodium	23	61	47	131
Potassium	39	84	44	192
Urea	60	66	38	174
Creatinine	113	43	46	93
Uric Acid	168	45	7	687
Glucose	198	25	15	170
Bromsulfopht.	838	2	0.2	945

where Pl/Cu% is the permeability ratio. The polycarbonate membranes have much higher permeabilities than Cuprophane, chiefly for substances of mol wt between 168 and 838.

Single-needle continuous flow hemodialysis without a control module. *S.T. Boen, W.A.G. Haagsma-Schouten, and R.J. Birnie. Sint Lucas Hospital, Amsterdam, Netherlands.* A new double lumen single needle ("Duo-cath") became available, and we will report our initial experience in ten patients. The device consists of a 13-gauge arterial needle, through which a 16-gauge inner needle with a blunt end (venous needle) is inserted. The two channels are separated from each other, and both needles are functioning simultaneously during dialysis (continuous flow). Single-needle dialysis without the use of a control module is now possible. Recirculation tests were performed at blood-flow rates of 200 ml/min or higher. In eight patients, less than 10% recirculation was found (range, 1.6 to 8.1) and in two patients, between 15 and 18%. Fistula aneurysm, which acts as a mixing chamber, was probably the cause of the high percentage of recirculation in one patient; three tests during three different dialyses showed the same magnitude of recirculation in this patient. The outflow pressure was 10 to 15 mm Hg higher compared to two-needle dialysis. The double lumen needle is somewhat more difficult to insert, and a small amount of blood spatters and is spilled during replacement of the tapered mandrin by the venous needle. The spattering of blood may prohibit its use in HBAg positive patients. We conclude that the Duo-cath is a step forward for the use of single-needle dialysis. The longer duration of dialysis compared with two needle dialysis can be calculated from the recirculation percentage.

Chloramines, an aggravating factor in the anemia of patients on regular dialysis treatment. *J. Botella, J.A. Traver, D. Sanz-Guajardo, M.T. Torres, I. Sanjuan, P. Zabala. Clinica Puerta de Hierro, Madrid, Spain.* In two dialysis centers, with a total of 56 patients, it was found that the tap water had a concentration of total chlorine, ranging from 0.5 to 1.1 ppm, with a 50 to 95% of chloramines, (70% as mono and 30% as dichloramine). Eighty-three percent of the patients had Heinz bodies. Incubating the red blood cells with the dialysate caused an increase in metahemoglobin from $\bar{X}$ 1.45% to $\bar{X}$ 5.07%, $P < 0.0001$, and the ascorbate-cyanide test was positive in all samples. Treatment was started with 500 mg i.v. of ascorbic acid, once a week, and the hematocrit increased from $\bar{X}$ 23.71 to $\bar{X}$ 25.88, $P < 0.025$. Later an accidental and occasional increase in the concentration of chlorine to 3.5 ppm caused a sudden drop in the Hct to 20.73 $\bar{X}$, $P < 0.0005$. At the present time ascorbic acid is added to the dialysate (1.7 mg/100 ml) and only 5.56% of the patients present Heinz bodies, $P < 0.0005$. *Conclusion.* In some dialysis centers, chloramines may be aggravating, chronically and acutely, the anemia of their patients. This problem is solved by adding ascorbic acid to the dialysate.

Failure of renal renin depletion without forced diuresis to protect rats against mercuric chloride-induced acute renal failure (ARF). *D. de Rougemont, F. Brunner, J. Torhorst, L. Peters-Haefeli, G. Thiel. Basel, Switzerland.* Further experiments were designed to conclusively dissociate the effect of massive diuresis from that of renal renin depletion in mercuric chloride-induced ARF (6 mg of $HgCl_2$/kg BW s.c.). Renal renin depletion was induced in uninephrectomized rats by four weekly injections of 150 mg of DOCA/kg BW and substituting 1% NaCl for drinking water for two months; group A ($N=10$) continued on 1% NaCl when injected with $HgCl_2$; group B ($N=8$) was thirsted for 24 hr before being injected with $HgCl_2$, and then received water for drinking. High diuresis without renal renin depletion was induced in group C ($N=9$) by continously infusing 96 ml/day of saline with furosemide, 100 mg/liter, two days before, during, and after $HgCl_2$ administration.

Results:

	Urine flow before $HgCl_2$ *ml/day*	P-urea at 48 hr *mg/100 ml*	Renin after $HgCl_2$ *ng AI/mg cortex/hr*
Group A	47 ± 6	180 ± 21	14 ± 3
Group B	10 ± 1	342 ± 40	29 ± 6
Group C	68 ± 5	38 ± 8	763 ± 72

Conclusions: Renal renin depletion without increased diuresis does not protect against mercuric chloride-induced ARF, while forced diuresis protects despite high renal renin.

Combined report on regular dialysis and transplantation in Europe, VII, 1976: Part 2. *F.P. Brunner, C. Chantler, R.A. Donckerwolcke, H.J. Gurland, R. Hathway, C. Jacobs, N.H. Selwood, A.J. Wing, St. Thomas Hospital, London. England.* Statistical report on intermittent dialysis and transplantation: more detailed information cannot be given, as the computer data will only be available shortly before the congress.

Graft survival and blood transfusion. *H. Brynger, B. Frisk, J. Ahlmén, P.-O. Attman, I. Blohmé, L. Sandberg, and L.-E. Gelin. Surgical Department I, and Blood Centre, Sahlgren's Hospital, University of Göteborg, Göteborg, Sweden.* The purpose of this study was to investigate the effects of preoperative blood transfusion on graft survival after kidney transplantation in a single center material. 241 patients receiving primary kidney grafts were retrospectively studied. Noninformative cases were excluded. 22% of the patients had been transfused prior to transplantation. In dubious cases, interviews with the patients were carried out. It was found in patients receiving kidneys from related living donors sharing one HLA-haplotype with the recipient that the one-year graft survival (nonimmunologic causes of graft loss excluded) was inferior, 25% compared to 85% in the transfused group. In recipients of cadaveric kidneys, the difference was 20% between the two groups. One group of 16 nontransfused patients from one dialysis unit was separately studied. The patients were all in a good general condition at the time of transplantation. 13 of the grafts were lost due to rejection within one year. It could be concluded that primary kidney transplantation in patients not transfused prior to operation has an inferior success rate compared to transfused patients.

Loin pain and renal microvascular disease. *R.P. Burden, J.R. Dathan, P. Guyer, A. MacIver. Southampton University Hospitals, England.* A study has been made of patients with recurrent loin pain in whom urinary infection and structural abnormalities of the urinary tract had been excluded, in an attempt to confirm earlier reports of a syndrome of loin pain with radiologically abnormal intrarenal vasculature. Attention was paid not only to renal angiography but also to renal histology, including immunofluorescent and electron microscopic techniques. Nine patients were studied in a 12-month period. All were female with a mean age of 25 yr. Symptoms were related to oral contraception in five. Angiographic abnormalities of the peripheral intrarenal arteries were demonstrated in all, including increased tortuosity, variations in the width of the lumen, partial or complete occlusion, and stasis of contrast. The nephrogram showed loss of the normal distinction between cortex and medulla and evidence of cortical ischemia. Renal histology revealed mild mesangial proliferation and increase in matrix, variation in the width of the basement membrane, but no evidence of dense deposits. Arterial abnormalities were confined to one patient with fibrin in an intraglomerular capillary and five patients with either C3, IgG, or IgM in afferent arterioles. This study confirms previous reports of intrarenal vascular disease associated with loin pain in young female adults and supports the contention that an abnormality of the coagulation and/or fibrinolytic system is partly responsible for the pathogenesis.

Dialysis vs. integrated program of dialysis and transplantation. *A. Cantaluppi, A. Frontini, R. Licini, A. Tarantino G. Mecca, and C. Ponticelli. Divisioni Nefrologia, Bergano, and Milano, Italy.* Since 1972, 110 selected patients, treated by hospital (82 patients) and home (28 patients) dialysis (D), were listed for transplantation (Tx). Fifty-eight patients could be transplanted (56 with cadaver grafts), allowing us to compare, in two homogeneous groups of patients, the results of a policy of D *per se* (52 patients; age, 38 ± 9 yr; D age, 35 ± 24 months) with the results of a policy of D integrated with Tx (58 patients; age, 35 ± 8 yr; age of treatment, 41 ± 23 months). The integrated program has achieved an actuarial survival rate of 97% at one year and 92% at five years. Graft survival was 60% at five years. The D *per se* has achieved an actuarial survival rate of 98% at one year and 88% at five years. Of transplanted patients 89% are fully rehabilitated, compared to 67% of D pts. ($P < 0.05$). These results demonstrate that an integrated program of D and Tx offers a chance of life not different from that of D alone, and a better rehabilitation.

Intensive plasma exchange (IPE), complement-dependent microcytotoxicity (CDC), and renal transplant rejection. *C.J. Cardella, D.M.C. Sutton, J. Falk, A. Katz, P.R. Uldall, and G.A. deVeber. Toronto Western Hospital, Canada.* Uncontrolled rejection is often associated with antibody-mediated vascular injury. Conventional antirejection therapy is frequently ineffective. The apparent effectiveness of IPE in anti-GBM disease suggested the use of IPE in patients with uncontrolled humoral rejection. The 11 IPE treated rejection episodes in eight patients, who had received conventional immunosuppressive therapy, occurred 8 to 135 days post-transplantation. Each episode was progressive, unresponsive to conventional antirejection therapy, and associated with histologic evidence of humoral rejection. After IPE, the serum creatinine fell in six, plateaued in two, and continued to rise in three. Three of the eight grafts were eventually rejected, five of the eight maintained adequate function two weeks to eight months post-IPE. In order to define the group who responded to IPE treatment, serum cytotoxic antibody was monitored by CDC to a panel of cells from unrelated normals representing HLA-A, -B, and -C specificities. Seven of the eleven rejection episodes were studied. In four, a negative CDC became positive prior to the rejection, remained positive during rejection, and became negative after IPE. The serum creatinine fell in three of these four CDC positive rejections. In the other three, the CDC was negative throughout, and the serum creatinine did not fall after IPE. IPE in the presence of adequate drug-induced immunosuppression appears to be a useful adjunct to the treatment of severe vascular rejection, particularly those rejections associated with a positive CDC.

Ionized calcium during hemodialysis. *S. Conceicao, N.A. Hoenich, M.K. Ward, T. White, P. Aljama, J. Dewar, D.N.S. Kerr. University of Newcastle upon Tyne, England.* In spite of the popularity of high calcium dialysate internationally, most centers in UK continue to use a dialysate calcium of 1.5 to 1.6 mmoles/liter. We have studied the changes in serum calcium, ionized Ca, phosphate, protein, albumin, and PTH during dialysis against this fluid to see whether it suppresses PTH secretion. Arterial blood samples were drawn hourly during dialysis. Dialysate was checked hourly and its constancy confirmed. No PTH was detected in effluent dialysate. Mean results for the first 11 patients are shown.

Time	Ca^{++}	Ca	PO_4	PTH	Prot.	Alb.
Pre-D	1.01	2.43	2.27	1.74	70	42
1 hr	1.06	2.47	1.77	1.27	71	41
2 hr	1.10	2.55	1.52	0.88	72	43
3 hr	1.11	2.57	1.42	1.20	76	45
4 hr	1.11	2.57	1.50	1.15	76	45
5 hr	1.13	2.53	1.56	1.21	77	46

We conclude that a calcium dialysate of 1.54 mmoles/liter is sufficient to raise ionized calcium during dialysis. Patients so treated have little elevation of PTH predialysis, and it is further suppressed during dialysis. The rise in serum phosphate late in dialysis was unexpected but has been observed by others. Its significance will be discussed.

Hypothalamic-hypophyseal-gonadal axis in patients undergoing chronic hemodialysis. *C. Dalla Rosa, C. Cascone, F. Antonucci, I. Mastrogiacomo, C. Foresta. Nephrology Department, Ospedale Regionale, Treviso and Institute of Semeiotica Medica of the University Hospital, Padova, Italy.* The present study was undertaken to get a deeper knowledge of the correlations between the hypothalamic-hypophyseal-gonadal axis and the clinical conditions in patients undergoing chronic intermittent hemodialysis. In blood samples of 25 males and 30 females, we determined by radioimmunoassay testosterone, prolactin, FSH, and LH under basal conditions and after stimulation with hypothalamic-releasing hormone (LH/FSH-RH). LH is slightly above normal, and FSH is normal. Stimulation test with LH/FSH-RH reveals variable values; in females, peak is usually late. In males, the mean testosterone levels are lower than in normal controls, but in a wide range. In three patients with normal testosterone and FSH, sperm count

is below one million per ml. Eight males have normal testosterone and increased LH levels. Correlation between testosterone and impotence is partial. These findings suggest that gonadal insufficiency is usually primitive, but we can also find cases of hypothalamic-hypophyseal insufficiency (very low levels at the LH/FSH-RH stimulation test). The spermatogenesis is early damaged. In 80% of males, impotence is related to low testosterone levels, in other patients alternative causes must be considered (psychical disturbances, the degree of neuropathy). Prolactin is likely one of the causes of amenorrhoea. Pathologic amenorrhoea can be differentiated from early menopause.

Treatment of peptic ulcer in renal failure. *C.C. Doherty, F. O'Connor, K.D. Buchanan, J.F. Douglas, and Mary G. McGeown. Renal Unit, Belfast City Hosp, and Department of Medicine, Royal Victoria Hospital Belfast, North Ireland.* Peptic ulceration occurs frequently in patients undergoing regular dialysis, and prophylactic vagotomy is frequently recommended We have studied 10 undialyzed uremic patients (CRF), 29 patients on regular hemodialysis (RD) and 70 renal transplant patients (RT). Investigations included barium meal and/or endoscopy, pentagastrin test, and fasting plasma gastrin. A very high incidence of ulcer was found in the RD group, (55%) and 20% of these had GI bleeding. The incidence of GI bleeding in the RT group was less than 10%. We found a significant difference ($P < 0.05$) in basal acid output between those with CRF (2.1 ± 0.58 mmol/hr) and those on RD (4.6 ± 0.83 mmol/hr). RD seems to lead to gastric hypersection and frequent ulceration. The above data suggest that this may not continue after transplantation. Cimetidene was given to 7 RD patients with endoscopically proven DU and gastric acid hypersecretion. Symptomatic relief and significant reduction of acid secretion were demonstrated, and no major side effects occurred. There appears to be a rational basis for conservative treatment of uncomplicated DU in the dialysis patient, and further evaluation of the new selective antihistamines is indicated.

Combined report of regular dialysis and transplantation of children in Europe, 1976. *R.A. Donckerwolcke, F.P. Brunner, C. Chantler, H.J. Gurland, R. Hathway, C. Jacobs, N.H. Selwood, A.J. Wing. St. Thomas' Hospital, London, England.* Statistical report in intermittent dialysis and transplantation: more detailed information cannot be given, as the computer data will only be available shortly before the congress.

Assessment of a whole blood assay for antibody-dependent cell-mediated cytotoxicity in kidney patients. *E. Dupont. Hôpital Universitaire Brugmann, Brussels, Belgium.* Effector cell (K cell) function has been proposed as a tool for investigation of immunosuppressive therapy and has been assessed in kidney patients with a method requiring minimal amounts of *whole blood.* Separation techniques are avoided leaving cell populations unaffected. Use of 50 μl of heparinized whole blood in microtubes followed by plasma washing and targets (^{51}Cr labelled lymphocytes coated with rabbit ALS) adding in a constant volume of medium makes unnecessary corrections for variation of packed red cells volume. Participation of phagocytic cells is unlikely as cytotoxicity level is not modified by carbonyl iron powder absorption. Comparison of cytotoxicity expressed by 50 μl of whole blood with the activity of isolated lymphocytes at various effectors/targets ratios shows that in normal subjects and dialysis patients, the activity of whole blood is always superior to the results obtained by 10^5 lymphocytes, while in transplant patients it is always below the activity of 2.5 10^4 lymphocytes, reflecting the combined effects of lymphopenia and depressed cellular function. This assay represents, thus, a more physiologic test for immunosuppression assessment.

Effects of disodium cromoglycate (DSCG) and antihistaminics (AH) in acute serum sickness. *J. Egida, M. López-Trascasa, M. Sánchez Crespo, M. García-Sánchez, A. Baraf, L. Hernando, S. Casado. Fundación Jiménez Díaz, Madrid, Spain.* An increase of vascular permeability seems necessary for the deposition of immune complexes (IC) in acute serum sickness (ASS). It has been recently shown that a reduction in circulating basophil count occurs 48 hr before the onset of proteinuria. It has been suggested that the use of DSCG or AH produces an important improvement of the nephritis. ASS was induced in rabbits by a single iv. injection of bovine serum albumin (BSA), labelled with ^{125}I, at a dose of 250 mg/kg BW. To enhance the incidence of disease, 10 mg/kg of BSA in Freund's complete adjuvant was subcutaneously (s.c.) injected three days before the large dose of BSA. Levels of ^{125}I-BSA, total leucocyte basophils, and proteinuria were determined daily. Circulating IC were assayed by measuring the amount of ^{125}I-BSA precipitated from the plasma by 50% ammonium suphate at 4°C. Four schedules of treatment were employed: group A, DSCG at 5 mg/kg/day; group B, DSCG at 50 mg/kg/day; group C, DSCG at 50 g/kg/day and hydroxicine at 30 mg/kg/day; group D, DSCG at 50 mg/kg/day and *D*-clorofeniramine at 0'30 mg/kg/day. The DSCG was always administered in five, s.c., and the AH in three. Twelve rabbits were used as controls. The kidneys were studied by light microscopy and immunofluorescence and some with electron microscopy. Only rabbits with similar levels of IC were compared. All treated animals except group A disclosed a lower number of glomerulonephritis (GN). Rabbits with GN presented no difference with controls in intensity of proteinuria and immune deposits in the glomeruli. Some rabbits, injected again with a large dose of BSA after interruption of drugs, developed GN. At this time, the diminution of circulating basophils was significant. In summary, DSCG and AH protect some rabbits and not at all some others. Therefore, other drugs capable of inhibiting the basophil degranulation and antagonizing permeability factors, including PAF, are needed.

Exact regulation of ultrafiltration. *J.A. Flendrig, W.M. Carpay, W.T. Dekkers. Catharinaziekenhuis, Eindhoven, Netherlands.* An apparatus has been constructed to regulate ultrafiltration accurately during dialysis. The principle of the apparatus is that per time period exactly the same quantity of bath fluid is put into the kidney as is taken out. The apparatus consists of two isovolumetric pumps connected in line. The four compartments of the two pumps have to change their functions at every pumpstroke. This is accomplished by a switch-system. There is a continuously closed dialysate circuit. The fluid extracted from this closed circuit will be replenished from the blood compartment of the kidney. Ultrafiltration is regulated by a simple peristaltic pump, which sucks the fluid out of the closed dialysate circuit. The isovolumetric pumps and the switch-system are driven by the elevated pressure of the dialysate (0.5 to 1 Ato). The apparatus can be used in single pass dialysis as well as in recirculation dialysis. Diafiltration and dialysis according to the Bergström principle can be simply performed. Since August, 1975, more than 3,000 dialyses have been done with this apparatus. Several types of artificial kidneys are used: R.P.-6, Gambro-Lundia, H.F.A.K. Ultrafiltration was always accurate within the measuring limits. Considerable improvement was noticed in the well-being of the patients. Hypotension, nausea, vomiting, and muscle cramps were not seen anymore.

Reduction in complications and ultrafiltration intolerance in high efficiency dialysis. *U. Graefe, W.C. Follette, and B.H. Scribner. Department of Medicine, University of Washington, Seattle, U.S.A.* Poor ultrafiltration tolerance and an increased incidence of symptoms are limiting factors in the use of short-time, large surface area dialysis (LS). In previous studies, we demonstrated that ultrafiltration tolerance can be improved significantly (around 70%) when LS is performed using bicarbonate (LS-B) instead of acetate (LS-A) in the dialysate. Bergström suggests that limited ultrafiltration tolerance is caused by changes in plasma osmolality. To examine this idea, we repeated our previous studies with LS-A and LS-B and measured osmolality changes in five patients. The plasma osmolality decreased by 15 mOsm on LS-B and 9 mOsm on LS-A. We also tested the influence of LS-A and LS-B on the well-being of six patients, using the Continuous Performance Test as an objective quantitation of dialysis-related fatigue before and after dialysis. The decrease in scores on LS-A was 29%, while on LS-B the decrease was only 9%, $P < 0.004$. These results suggest that osmolality shifts are not a major factor in limiting ultrafiltration tolerance. Further, LS-B dialysis may reduce the postdialysis morbidity associated with LS-A treatment.

Effect of aldosterone and dexamethasone on the diluting capacity of thick ascending limbs (TAL) in experimental adrenal insufficiency. *H.-U. Gutsche, G. Beer, W. Niedermayer, and M. Mâlyusz. Department of Spec. Nephrology, and Department of Physiology, University of Kiel, Germany.* Indirect evidence points to an impaired diluting capacity of TAL in adrenal insufficiency. Experiments have been performed on adrenalectomized Wistar rats in order to determine the effect of mineralocorticoid and of glucocorticoid activity on the time course and the steady state of electrolyte dilution in the TAL. Pulsed-stopped microperfusion experiments were performed on functionally isolated loops of Henle, and TAL ion concentration was monitored with a continuously recording conductivity probe. *Results.* The time course of dilution was significantly delayed after adrenalectomy. Maximal dilution within the TAL under stationary conditions was 28.5 ± 3.5 mM NaCl in controls and 54.5 ± 6.5 mM NaCl ($P < 0.001$) after adrenalectomy. Aldosterone (10 μg/100 g, three days) caused a slight, but not significant improvement of the transport impairment. Dexamethasone (50 μg/100 g, three days), however, led to a complete normalization of the diluting capacity (26.6 ± 3.5 mM NaCl). It is concluded that the NaCl reabsorption in the TAL is regulated by the action of glucocorticoid hormones.

Is parenteral or oral substitution of essential amino acids beneficial in patients on chronic hemodialysis? *E. Hecking, H. Köhler, H. Mader, R. Zobel. I. Med. Univ. Klinik, Mainz, Federal Republic of Germany.* Improvement of total protein, albumin, transferrin, and several components of the complement system has been reported to occur following infusion of essential amino acids (ess. AA) in patients on chronic hemodialysis. Thirteen adult patients out of the chronic home dialysis program received either 15 g/day of ess. AA orally (five chewing tablets) or placebo preparations for three months in a double blind study. For another three months, the medication was crossed over. In addition, seven patients on chronic clinical dialysis were studied over six months. After a control period of three months, 17.25 g of ess. AA were infused i.v. during the last 90 min of dialysis for a period of three months. Oral and parenteral treatment with ess. AA did not result in significant changes of protein pattern (total protein, albumin, transferrin, haptoglobin, vitamin A, retinol binding protein, prealbumin, complement (CH50), and five complement components). Oral therapy with ess. AA produced a significant ($P < 0.01$ to 0.05) increase of blood urea and uric acid and a decrease of iron. Parenteral therapy with ess. AA led to a small ($P < 0.05$) increase of blood urea, calcium and phosphorus. In conclusion, we cannot generally recommend the oral or parenteral high dose application of ess. AA in dialysis patients. By contrast, adverse effects may occur also.

Cuprophan hollow fiber dialyzers. *N.A. Hoenich, J. Luno, F. Liano, T. White, D.N.S. Kerr, University of Newcastle upon Tyne, England.* Cuprophan hollow fibers (Enka Glanzstoff) are used in a number of new disposable dialyzers, those manufactured by Travenol (CCF), Asahi (K101, K102), Cobe (HF130), and Bentley (SD1) have been studied together with the Cordis CDAK, which uses cellulose acetate fibers. The dialyzers' small molecular clearance and ultrafiltration characteristics are shown below, and indicate that despite their smaller surface area, Cuprophan hollow fiber dialyzers offer a greater flexibility in ultrafiltration. They are ethylene oxide sterilized and consequently, easier to handle and use, compared with the formalin sterilized cellulose acetate hollow fibers:

	Surface area, m^1	Clearance		Ultrafiltration rate
		Urea	Creatinine	*ml/min/mm Hg*
CF	1.5	149	127	0.066
K101	1.1	139	109	0.066
K102	1.6	158	129	0.076
HF130	1.3	145	—	0.045
SD1	1.3	175	146	0.075
CDAK	1.8	174	145	0.043

High efficiency miniature dialyzers: A comparison. *N.A. Hoenich, J. Luno, T. White, D.N.S. Kerr. University of Newcastle upon Tyne, England.* Small, compact multilayer disposable dialyzers which use polypropylene mesh in place of the conventional molded plastic plates have recently been produced and used clinically. Three such designs, the Travenol CP Standard (0.9 m^2), the Cobe PPD (1.3 m^2), and the Hemoclear u Nephross (1.4 m^2) have been studied. These designs offer high performance, low internal volume, and a low blood compartment volume, making them ideal for both adult and pediatric use. Their performance, however, varies considerably with the duration of dialysis, and this variation is influenced by the type of proportionating system used. A very efficient dialysate deaeration system is required to prevent the collection of air in the dialysate pathways of these small dialyzers.

	No. of blood layers	Clearance		BCV[a]	Ultrafiltration rate
		Urea	Vit. B_{12}		*ml/min/mm Hg*
Travenol CP	150	147	24	67	0.046
Cobe PPD	65	149	30	90	0.061
Hemoclear	61	159	31	64	0.055

[a] Blood compartment volume at a transmembrane pressure of 100 mm Hg.

Hemofiltration: A useful adjunct to dialysis. *P. Ivanovich, C. Huang, N. Stefanovic, and F. del Greco. Department of Medicine, Section Nephrology Hypertension, Northwestern Univ-McGaw Medical Centers, Chicago, USA.* Between August 1976 and February 1977, hemofiltration (HF) immediately following hemodialysis (HD) has been used 195 times in 25 maintenance HD patients. In 9 of these patients, HF was performed without HD for relief of pulmonary edema or severe intravascular volume overload. The Model 5 Cordis Dow Hollow Fiber Artificial Kidney (CDAK 2.5) was used in all patients both for HD and for HF. Average ultrafiltrate removal was 1.6 liter/hr at transmembrane pressures of 600 to 750 mm Hg with a total of 2.8 liters being removed per treatment. Saline was required to treat hypotension during HD in 14 instances, with an average infusion of 240 ml. Rarely was additional saline required when HF was used after HD. When combined with HD or if used independent of HD, HF resulted in decreased intravascular volume without significant hypotension and attendant symptoms. In those patients treated by HF exclusively, weight loss averaged 5.1 kg. Blood pressure monitored at 30-min intervals in these volume overloaded patients averaged 158/97, 163/97, 149/93, and 150/94, respectively. The biochemical nature of the ultrafiltrate was similar to plasma except for insignificant quantities of protein and enzymes. Neither plasma nor ultrafiltrate contained free hemoglobin. HF alone or in combination with HD using the CDAK 2.5 is a safe, rapidly effective and asymptomatic method for controlled fluid removal in maintenance HD patients.

Combined report on regular dialysis and transplantation in Europe, VII, 1976: Part 1. *C. Jacobs, F.P. Brunner, C. Chantler, R. Donckerwolcke, H.J. Gurland, R. Hathway, N.H. Selwood, A.J. Wing. St. Thomas' Hospital, London, England.* Statistical report on intermittent dialysis and transplantation: more detailed information cannot be given, as the computer data will only be available shortly before the congress.

Separation of dialysis and ultrafiltration: Does it really help? *E.O. Jones, M.K. Ward, N.A. Hoenich, D.N.S. Kerr. University of Newcastle upon Tyne, England.* At Hamburg, Bergstrom presented evidence that ultrafiltration without dialysis (UF alone) caused less hypotension, nausea, headache, and cramps than fluid removal during dialysis (UF&D). We tested this claim as follows: *a) Ten paired studies of UF alone vs. UF&D for rapid fluid removal (10 to 21 ml/min) from patients on RDT.* All on UF&D had hypotension or/and nausea and vomiting, requiring IV saline. Osmolality fell 10 to 20 mOsm/kg. No patient on UF alone experienced these symptoms or required saline. *b) Thirty unpaired studies of UF alone*

in RDT patients with acute (12) or chronic (18) fluid overload. LVF was dramatically relieved. No patients had hypotension, nausea, headache. *c) Cross-over study of UF alone (1 hr) plus dialysis (3 hr) vs. UF&D (4 hr) using Rhodial 75 and RP6.* Results to date show less symptoms when UF is separated from dialysis. *Conclusions.* We support the claims of Bergstrom for UF alone. We have used a wide range of dialyzers to produce UF without technical difficulties. The technique has been used successfully in nonuremic patients with heart failure.

Serum antibodies (AB) before and after immunization in hemodialized children. *C. Kleinknecht, A. Margolis, C. Bonnissol, M. Gaiffe, S. Sayoun, M. Broyer. Hôpital des Enfants-Malades, Paris, France.* To study humoral immunity in non-immunized dialyzed children, serum AB was measured before and after vaccination. *I) Before vaccination.* No detectable AB's were found against measles, pertussis, poliomyelitis and diphtheria in respectively 22/52, 17/50, 30/50, and 23/24 children studied. By contrast 39/46 children had protective antitetanic AB titers; of the 21 children who had never been immunized, 13 had AB titers between 0.1 and 0.15 μ/ml. Despite the absence of antidiphtheric AB, the Schick test was negative in all children. *II) After vaccination. 1)* Following adsorbed vaccines against diphtheria, tetanus and pertussis, seroconversion was obtained in respectively 16/17, 21/21, and 18/18 patients. Inactivated poliomyelitis vaccine administered to 11 children led to seroconversion for viruses I, II and III in 70%, 100%, and 64% of cases. Using live attenuated vaccine in 30 childrens seroconversion occurred in only 31%, 64%, and 31% of cases for the three viruses. Measles vaccine was ineffective in 11/12 patients. *Conclusion:* Humoral immunity is normal in dialyzed patients since adsorbed vaccines resulted in a normal AB increase. Three abnormal findings were possibly due to uremia: *1)* the negative Schick test indicative of suppressed nonspecific skin reactivity; *2)* the inhibition of tetanus toxin by uremic sera; *3)* decreased response to live vaccines contrasting with a normal response to inactivated vaccines and toxoids.

Successful hemodialysis and renal transplantation in a patient with hemophilia A. *R.A.P. Koene, P.G.G. Gerlag, J.L.J. Jansen, V.A.J. Kunst, P.G.A.B. Wijdeveld. Department of Medicine, Division of Nephrology, University of Nijmegen, The Netherlands.* A 19 year old male with severe hemophilia A (factor VIII activity, less than 1%) developed terminal renal insufficiency and was subsequently dialyzed via an external arteriovenous cannula during one year. To prevent bleeding he received cryoprecipitates from eight donors, three times a week during dialysis. After one year of uneventful dialysis, he received a kidney graft from a cadaver donor that was matched for the B locus antigens. During the first two weeks after transplantation, his factor VIII level was kept above 70% by daily cryoprecipitate infusions. Thereafter, he was free from bleeding at a level of 20% with cryoprecipitates from eight donors, three times a week. He was discharged from the hospital five weeks after transplantation with excellent renal function (ECC, 75 ml/min). No rejection crisis occurred. His factor VIII requirements remained unchanged after transplantation, indicating that the human kidney does not substantially contribute to factor VIII production.

Interrelationship between blood pressure, kidney function, renin-aldosterone system, and body sodium content in kidney transplant artery stenosis (KTAS). *H.J. Kornerup, E.B. Pedersen, and O. Fjeldborg. Department of Medicine C, Århus Kommunehospital and Århus University, Århus, Denmark.* Plasma renin concentration (PRC) and plasma aldosterone concentrations (PAC) were examined in nine hypertensive recipients with KTAS and in eight normotensive recipients comprising the controls. In addition, blood pressure, kidney function, PRC, PAC, and exchangeable sodium (Na_E) were studied before and after surgical correction of KTAS in five recipients. PRC was normal and responded normally to oral sodium-restriction and -loading in six of nine recipients with KTAS. In the remaining three PRC was varyingly increased on liberal sodium intake, but suppressed to normal range by sodium-loading. PAC did not differ from the controls. The effect of surgical correction of KTAS was uniformly an increase in GFR and RPF, associated by a decrease in Na_E and blood pressure. Preoperative values were normal in all. The results indicate that sodium retention, which may counterbalance an increased activity of the renin system, is involved in the pathogenesis of hypertension due to KTAS. Hence, preoperative determinations of PRC are difficult to evaluate with regard to predicting the effect of surgical correction of KTAS on hypertension.

Changes of plasma concentrations and elimination of various hormones by hemofiltration. *P. Kramer, D. Matthaei, R. Arnold, P. Ebert, Ch. McIntosh, P. Schauder, G. Schwinn, F. Scheler. University Hospital, Department of Internal Medicine, Humboldtallee 1, D 3400 Göttingen, West Germany.* Since hemofiltration (RP-6, Rhône Poulenc) causes a considerable loss of polypeptides with a mol wt up to 20,000 daltons, hormone deficiency might be an undesirable side-effect of this new method. Therefore, the elimination rate and changes of the plasma concentration of various hormones (testosterone, cortisone, gastrin, GIP, somatomedin B, insulin, glucagon, HGH, TSH), ranging in their mol wt from 288 to 28,000 daltons, were investigated in five patients on intermittent hemofiltration. HGH, TSH, and cortisone were not eliminated to a significant extent. A considerable total elimination was observed for testosterone (2.6 to 4.6 μg), gastrin (0.5 to 1.1 μg), GIP (14 to 73 μg) and somatomedin B (14 to 26 mg). This loss, however, did not affect the plasma concentrations. Only the high loss of somatomedin B, a hormone which is necessary for growth development, appears to be of clinical relevance and might eventually limit the usefulness of hemofiltration for the treatment of uremic children. The high elimination rate of GIP, a gastrointestinal hormone which has a potentiating effect on the insulin secretion, may explain the favorable effect of hemofiltration treatment on the disturbances of carbohydrate and lipid metabolism in uremic patients.

New automatic hemofiltration machine with continuously monitored fluid balance. *P. Kramer, D. Matthaei, J. Rieger, E. Quellhorst, F. Scheler. University Hospital, Department of Internal Medicine, Division of Nephrology, D 3400 Göttingen, West Germany.* According to preliminary experience, hemofiltration seems to be the treatment of choice for uremic patients with hyperphosphatemia, hyperlipidemia, intractable hypertension, and undisciplined fluid intake. One major problem in hemofiltration has been so far the high personal demand, especially with regard to the control of fluid balance. First, experience is presented with a new hemofiltration device, providing a continuously monitored fluid balance, which needs only minimal supervision by the dialysis staff. A special pressure-weight-volume-feedback-system allows preselection of a constant fluid withdrawal with a total error of less than 150 ml/6-hr-treatment. The advantage of constant fluid withdrawal with an automatic device for the administration of substitution fluid could be demonstrated in 36 hemofiltration treatments with this new machine in an uremic patient who was switched to hemofiltration two years ago because of "dialysis-resistent hypertension." The patient's well-being even after a reduction of body weight by 3 to 4 liters of fluid during a 6-hr hemofiltration demonstrates the importance of constant withdrawal of isotonic fluid. According to our preliminary experience, this new hemofiltration machine (model, Oelrichs) seems to be a great progress in the management of water-intake problems as found in many patients on hemodialysis.

Immunological diagnosis of rejection in human renal allotransplanted patients: A prospective study. *T. Kristensen, N. Grunnet, H.E. Hansen, O. Fjeldborg, S. Olsen, and F. Kissmeyer-Neilsen. University Hospital, Aarhus, Denmark.* The objective of this study has been to evaluate the recipient's immunologic reactivity towards donor lymphocytes in relation to rejection episodes. All recipients (20) of local necrokidneys during 1976 were immunologically monitored immediately before transplantation and subsequently twice weekly for donor-specific complement dependent lymphocytotoxic (CDC) antibodies, antibody dependent cell-mediated cytotoxicity

(ADCC) and cell-mediated lympholysis (CML). Experiments were performed until graftectomy or dismissal (approx. 1100 patient days). Clinical diagnosis of rejection was made independently of immunologic results. All clinically suspected rejection episodes, except one, were checked by microscopy. A positive CML-test accompanied 9 out of 11 rejection episodes; the test was negative on all other occasions. Positive CDC and ADCC tests exhibited no evident correlations to rejection episodes; positive ADCC may be more frequent in clinically uncomplicated phases. Positive CML did not generally proceed clinical graft rejection. Positive CML before transplantation was observed in two cases and was followed by irreversible, accelerated, acute rejections. The immunogenetic specificity of *in vivo*-educated cytotoxic lymphocytes is unclear. The CML-test may prove a reliable tool in rejection diagnosis and may yield results comparable to graft-biopsy without inflicting any risk on the patient.

Evaluation of 433 cases with acute renal failure. *L. Lachhein, R. Kielstein, K. Sauer, P. Reinschke, V. Müller, I. Krumhaar, D. Falkenhagen, R. Schmidt, H. Klinkmann. W.-Pieck-Univer. Rostock, DDR.* During the period between 1966 and 1976, 433 patients with acute renal failure underwent hemodialysis. The causes of acute renal failure were classified in eight groups. Postoperative conditions (24.9%), epigastric diseases, mainly pancreatitis and "hepatorenal syndrome" (15.0%), and urological diseases including abscess-forming pyelonephritis (14.5%) are the most frequent causes of acute renal failure, amounting to 54.4% of the patients. The remaining primary diseases are subdivided into septic-toxic causes, intravascular hemolysis, intoxication with uremia, and miscellaneous diseases. The overall mortality amounts to 50.3%, ranging from 33 to 63% within the different groups. The patients of the different groups were analyzed concerning age and sex distribution. With regard to time, the analysis shows that there is no essential change in the frequency and mortality of acute renal failure.

Automatic control of ultrafiltration. *N.A. Larsen, B. Nielsen, B. Petersen, B. Funck Jensen. 3rd Medical Department (Nephrology), Copenhagen Kommunehospital, Copenhagen, and Automata A/S, Aarhus, Denmark.* A system for automatic control of a variable ultrafiltration rate during hemodialysis has been constructed. Signals from a modified bed scale (Brook-line) served as input. A control unit continously recorded deviation of the patient's actual weight from a pre-programmed weight loss curve. The readings served as the output signals controlling the dialysate vacuum. A damping device eliminated the effect of short-term bilateral weight excursions. Dialysate was supplied at a constant inflow rate and pressure. A clinical trial of the system in 28 hemodialyses with a plate dialyzer showed that the total weight loss, and the rate at which it occurred, were consistent with the programmed course in 11 dialyses. The damping device functioned satisfactorily. In 17 dialyses, the rate of weight loss and the planned weight loss differed from those programmed. In all of these dialyses, the limited ultrafiltration capacity of the prototype and the lacking automatic correction of sudden unidirectional weight were found to be the cause. These technical problems are easily overcome, and the principles are thus ready for application in future dialysis monitoring.

Surgical complications in 500 kidney transplantations. *B.L. Lindström, O. Lindfors, B. Eklund, J. Ahonen, R. Collan, B. Kuhlbäck, B. Kock, and J.V. Brotherus. Kidney Transplantation Unit, Helsinki University Central Hospital, Helsinki, Finland.* The complications needing surgical attention or surgery in 500 kidney transplantations performed between December 1964, and October, 1976, are reported. Among the *early* surgical complications from the graft itself, 21 ruptures caused surgical intervention; 15 grafts were removed. The incidence of ureteral necrosis was low ($N = 8$). Complications due to technical problems during the transplantation procedure were few despite the number of 2 to 3 anastomosed arteries in the series reported. The dominating surgical complications were gastrointestinal and urological. The mortality rate in gastroenteral bleeding and cases of perforating gastroduodenal ulcera were very high.

A typical *late* complication needing surgery is hypertension due to renal artery stenosis and hydronephrosis caused by ureteral stricture. Interestingly, no cases of lymphocele were observed in this series.

Effect of albumin on diffusion rates of basic peptides across semipermeable membrane. *K. Markiewicz, W. Lutz. Institute of Internal Medicine, Medical Academy, Lódz, Pland.* The dffusion rates of basic peptides with mol wt of 1200 to 1800 daltons, isolated from uremic serum, across a semipermeable membrane (Nephrophan Dialysiermembrane) were studied. They were found to have a markedly slower passage to dialysate than urea and creatinine. The diffusion rates of basic peptides across the membrane depended on their mol wt. Considerable improvement of basic peptide diffusion rate was observed after albumin addition to dialysate. Owing to peptide fixation on albumin present in dialysate, more advantageous gradients of peptide concentrations were obtained between dialysate and fluid.

Preservation of cadaveric renal allografts. *V.C. Marshall, H. Ross, D.F. Scott, S. McInnes, and R.C. Atkins. Monash and Melbourne Universities, Melbourne, Australia.* Renal allografts performed in Melbourne prior to 1972 (150) were preserved by ice-cooling after an isotonic dextran flush; 200 grafts from 1972 to 1975 were preserved by machine perfusion. Storage times were increased 4-fold by machine preservation (from 4 to 17 hours), while acute tubular necrosis (ATN) and one year survival times were similar in each group. Improved results of ice storage after flushing with hypertonic solutions have been reported recently. In our hands, a new hypertonic citrate (HC) flushing solution has given best results experimentally, with successful preservation after three days of ice storage. Since early 1975, machine perfusion and ice storage after HC flush have been compared on matched kidney pairs from the same donor. In 65 consecutive grafts, warm ischemia and total storage times were similar in ice-stored and machine-perfused kidneys (22 vs. 27 min, 14 vs. 16 hr); ATN occurred in 40% and 45% of cases, respectively. In both groups, storage for 24 hr was compatible with immediate early function; and one year survivals were also similar. Early results indicate no advantages of machine preservation in clinical cadaveric transplantation on functional, immunologic, or economic grounds.

Blood access in hemodialysis: Long term results. *J.P. Masselot, P. Bonnaud, C. Ciancioni, J.M. Claude, J. Zingraff, J. Crosnier. Hopital Necker, C.E. Rist, C.C. Alma, Paris, France.* 349 surgical procedures for blood access have been performed in 310 hemodialysis patients (pts) during a five-year period (1971 to 1976). In 148 pts (48%), Cimino fistula at the wrist was successful (mean follow up, 27 months). The other 162 pts needed a secondary blood access: in 86, anastomosis was made using a proximal artery (one year success, 61%); seven A-V loops with autogenous saphenous grafts failed; 69 pts received saphenous allografts using part of removed varicose veins (one year patency rate, 56%). Infection rate was low (2%); infection did not require graft removal. No high output cardiac failure has been observed in this series. Arterial "steal" syndrome supervened in two cases and was cured by reduction of anastomosis diameter. The most frequent complication was vein thickening ("jet lesion") beyond the anastomosis; increasing venous pressure during dialysis and angiography of the fistula lead to an early diagnosis. The only treatment is surgical repair. In conclusion, as a primary blood access, Cimino fistula in a distal site should always be tried; for secondary access procedures, we prefer saphenous allografts. Angiography was revealed to be very useful in "difficult" patients.

Hyperglucagonemia and renal failure. *R. Matesanz, S. Casado, I. Valverde, L. Hernando. Fundación Jiménez Díaz, Madrid, Spain.* The role of the kidney in the hyperglucagonemia present in renal failure was studied. Plasma from hemodialysis patients (HD pts), normal subjects (N) and dogs, one day after nephrectomy, was

filtered on Bio-Gel P-30 and assayed with 30K antiserum. A marked basal hyperglucagonemia was found in HD pts (450 ± 74 pg/ml), mean ± SEM, $N = 32$, vs N, 244 ± 13, $N = 24$, $P < 0.0001$). No correlation was found between predialysis plasma glucagon immunoreactivity (GIR) and levels of urea, creatinine, potassium, calcium phosphate, total proteins, uric acid, or hematocrit. There were not statistical differences in plasma GIR from patients with and without residual renal function or with or without kidneys. This hyperglucagonemia has been shown to be due to high levels of both 3500 and 9000 mol wt GIR fractions. In anephric dogs, the t½ of disappearance during a somatostatin infusion was 1.5 to 2-fold greater than in intact dogs for the 3500 mol wt fraction or "true glucagon" and 3-fold for the 9000 mol wt component. Lack of functioning renal parenchyma clearly results in a rise of plasma GIR, due to an elevation of 3500 and 9000 mol wt GIR fractions. In HD pts, however, we found no correlation between GIR levels and severity of uremia or with measurements of residual renal function.

Long-term hemodialysis: An enhancing factor for cadaveric graft survival. *M. Mebel, W. Seeger, K. Richter, G. May, W. Dutz. Urological Clinic Friedrichshain, 2nd Medical Clin. Charite and Transfusion Inst., Berlin, Germany.* The influence of long term dialysis on graft survival has been investigated in a group of 220 consecutive cadaveric kidney grafts. The correlation of dialysis duration, graft survival, total average number of transfusions, and incidence of pretransplant HLA-antibodies in percent of antibody carriers in each group are demonstrated in the table:

Yr on RDT	Patient no.	Cumulative graft survival, *yr* 1	2	3	4	5	6	Pre-transplant trans-fusion	HLA-anti-body, %
<1	73	0.68	0.62	0.51	0.40	0.35	0.35	10	25
−2	81	0.58	0.50	0.42	0.40	0.40	0.40	26	43
−3	40	0.70	0.65	0.65	0.58	0.58	0.58	40	65
>3	26	0.70	0.70	0.70	0.70	0.70	0.70	56	77

The results show a positive correlation between dialysis duration and graft survival, possibly due to the formation of enhancing antibodies because of multiple blood transfusions. The role of a long lasting suburemic state remains to be discussed in this context.

A new (alloplastic) vascular prosthesis for reconstruction of subcutaneous A-V fistulae. *K. Möhring, U. Ikinger, H.W. Asbach. Department of Urology, Surgical Center, University of Heidelberg, Federal Republic of Germany.* Various alternatives including the use of auto-, hetero-, and homologous vascular material have been advocated if primary A-V fistulae fail. Since July, 1976, we have installed a new teflon prosthetic material (Gore-tex®) in ten patients, as a substitute for conventional vascular graft materials. All ten patients had been subjected to numerous fistula operations (up to 25) and presented with definite problems concerning vascular access. Five patients had the teflon prosthesis installed subcutaneously at their upper arm, using the brachial artery end-to-side and the brachial vein end-to-end. In five patients, the teflon graft was interposed between the formerly occluded, then desobliterated, radial artery and a suitable arm vein. All these newly created A-V fistulae are still functioning well. There have been no difficulties concerning triweekly double-needle punctures, blood flow, or bleeding at the puncture sites. A total of 27 dialysis-months has been covered by this new way of vascular access. In most cases, this was not only urgently needed but added much to the ease and comfort of repeated vascular access. The new teflon prosthesis lends itself for construction of A-V fistulae, since constructing loops, bends, etc., and anastomoses are easy, contrary to our experience with auto-, homo-, or heterologous material.

Comparison of dialysis programs on different molecular prescription: A preliminary study. *S. Nakagawa, M. Suenaga, N. Yoshiyama, J. Takeuchi, T. Kitaoka, S. Koshikawa, T. Yamada. Tokyo Medical and Dental University, Showa University, Josai Dental University, Tokyo, Japan.* With combination of various dialysis membrane area, diffusion pool sizes, or use of charcoal, it is now possible to plan programs in such a manner as we call "molecular prescription." Four prescriptions for three months in which removal of small molecules (SM) and middle molecules (MM) is different were compared in their effect on predialysis blood chemistry, Hct, EEG, NCV, inhibitory effect of plasma on pyruvate-kinase, lactic dehydrogenase, G-6-PhD, and cell mortality rate in rat embryo liver culture.

Contents of four prescriptions:

	$m^2 \times$ hr/week	Diffusion pool size	Use of charcoal	Removal SM	Removal MM
A	8.4	Single-pass,	No	Good	Bad
B	16.8	30 liters	Yes	Worse	Better
C	22.5	Single-pass,	No	Best	Good
D	12.0	10 liters	Yes	Worst	Best

After three months, case of prescription D, in which SM removal was worst and MM removal was best, showed mostly aggravated results in every parameters. We conclude that dialysis strategy only against MM, leaving aside SM, should be regarded as clinically meaningless. Recent enthusiasm on MM is worth reconsidering.

Integration of transplantation and home dialysis. *D.O. Oliver, P.J. Morris, J.G.G. Ledingham. Departments of Surgery and Nephrology, Oxford, United Kingdoms.* For 24 months ending 31st January, 1977, renal transplantation (RT) has been integrated with home hemodialysis (HD) for 119 patients aged less than 51 yr. Seventy-six patients have received 82 grafts, of which 75 were cadaveric (CD) and 7 were from living donors (LD). Six patients have received second CD grafts, including two in whom the first graft was LD. The mode of treatment at RT was home HD, 48 (58.5%); home HD training, 16 (19.5%); hospital HD, 16 (19.5%); and 2 children (2.5%) received CD grafts just before needing HD. Actuarial survival of grafts and patients at 3, 6, 12 and 24 months is calculated for the period of integrated therapy. Fifty-four grafts are functioning with graft survival of 68.5%, 62.1%, 62.1%, and 60.0%, while patient survival is 96.5%, 94.5%, 94.5% and 94.5%. There were four deaths in patients with functioning grafts, but no deaths in 18 patients returned to HD after failed grafts. In 29 patients on HD who have not received grafts, patient survival is 83.3%, 83.3%, 71.8%, and 71.8%. At the end of the period, 35 patients were on the RT list, 29 (82.9%) treated by home HD, 2 (5.7%) training for home HD, and 4 (11.4%) on hospital HD. With similar patient survival in comparable groups supported by either RT or mainly home HD in an integrated HD/RT program, there is no longer an ethical dilemma in the choice of treatment.

Clinical experience with circumferentially reinforced, expanded polytetrafluoroethylene (E-PTFE) graft as a vascular access for hemodialysis. *K. Ota, R. Ara, K. Takahashi, H. Toma, and T. Agishi. Kidney Center, Tokyo Women's Medical College, Tokyo, Japan.* Long term hemodialysis necessitates vascular grafts available to blood access. The E-PTFE graft appears to be superior to the bovine graft in terms of antithrombogenicity and dimensional availability. The sole defect found in the graft is its weakness to tensile strength exerted on transverse direction. A new graft is spirally reinforced with an E-PTFE tape to provide acceptable sealability and prevent kinking when used as a loop graft. Animal experiment using 12 dogs revealed its durable usability as a punc-

turable vascular graft. Thirty-one grafts (4 to 6 mm, I.D.; 18 to 33 cm in length, 0.8 mm in wall thickness) were implanted in the upper extremities of 30 patents, 28 for loop graft and 3 for straight graft. Anastomoses were completed without any difficulty, and bleeding from the suture line was easily controlled. All grafts have remained patent and functioned as vascular accesses for as long as 12 months, except one which was occluded by hematoma on the next day of the operation. Subcutaneous edema was a frequent complication immediately after the implantation. It gradually diminished, however, with a time lapse. Puncture was started one to three weeks after the operation in all cases with satisfactory punctuability and sealability. No aneurysmal dilatation has been observed in any cases.

An experimental study with phenacetin on kidney. *M. Özüer, H. Tanboğa, E. Akalin. Gülhane Military Medical Academy, Etlik, Ankara, Turkey.* Phenacetin is a drug commonly used as an analgesic. It's toxicity on kidney was investigated on 18 white rats. The drug was given according to the animal's weight, corresponding to two and four times higher than the dose therapeutically used in man. Animals were observed for a duration of six months. An interesting finding was that in animals with low dosage group, even in two months, pathologic changes were observed. This group exhibited edematous glomeruli and capillaries full of red cells in kidneys. At the end of six months, in low dosage treated animals, many histopathologic findings were seen. These findings demonstrated that lesions due to the phenacetin toxicity start not from the medulla, but rather from the cortex of kidney, and medulla is affected later. Although the previous investigations of others indicated that chronic phenacetin toxicity on kidneys could be observable at least in a year, in our study it was evident that the anatomopathologic changes due to phenacetin toxicity were demonstrable even in two months. In summary, this study indicated that patients who are taking drugs containing phenacetin for a long time might have periodic kidney functioning tests.

Efficacy of vaccine against hepatitis B: Epidemiological data. *J. Pengloan, Ph. Maupas, A. Goudeau, P. Coursaget, J. Drucker, Ph. Bagros, B. Grenier. Laboratory of Virology and Haemodialysis Unit, C.H.R. Bretonneau, Tours, France.* An inactivated hepatitis B vaccine was prepared, using HBs antigen from healthy blood donors. The vaccine was administered to 103 people: 30 patients and 73 staff members of two hemodialysis units. An epidemiologic study was carried out from the last three years in one of these hemodialysis units. It showed that the risk from year to year was 40% to 60% for new subjects to become HBs Ag positive in the nine months following their admission in the center. Since the beginning of the immunization in October, 1975, the nonvaccinated patients and staff members were infected by HB virus with a chance of infection not significantly different from that seen in the preceding years ($P = 0.40$). Comparison of the infection rate in the vaccinated and nonvaccinated patients and ward staff members in the 18 months after vaccination was begun shows that the vaccinated people had been protected from being infected ($P = 0.008$). After a year and a half of usage of the vaccination against hepatitis B, it seems, according to all the epidemiologic, clinical, and serologic data, that its safety and efficacy are very satisfactory.

Treatment of severe hypertension in chronic renal insufficiency (CRI) by hemofiltration. *E. Quellhorst, B. Schuenemann, H. Rieger. Nephrology Center Niedersachsen, Münden, Germany.* 15 patients (pts) with CRI were transferred from hemodialysis (HD) to a regular hemofiltration treatment (HF) because of a drug and dialysis resistant hypertension. HF was performed three times/week for five hours each, about 20 liters of body fluid being exchanged. Blood pressure (BP) was normalized in *all* pts within three months. Hct levels, plasma protein concentrations, renin activity, extracellular volume (ECV), total body water and blood volume were controlled repeatedly. At the start of HF treatment, BP was directly correlated to ECV. During a second period (6 to 8 weeks after the initiation of HF) BP remained normal, in spite of an increasing ECV, probably because of an influence on baroreceptor function. The withdrawal of large amounts of ECV by HF, in contrast to HD, did not influence the well-being of pts, perhaps as a consequence of an unchanged plasma osmolality. A change of the sodium concentration in the substitution fluid from 144 to 135 mEq/liter in HF induced a decrease of plasma osmolality as in HD with side reactions, whereas a replacement of lactate by acetate in the substitution fluid did not alter laboratory parameters and well-being. Thus, HF may be considered to be a safe and easily performed method for the treatment of severe hypertension in CRI.

Variable role of erythropoietin deficiency in the pathogenesis of dialysis anemia. *H.W. Radtke, P.M. Erbes, W. Fassbinder, K.M. Koch. Department of Nephrology, University Hospital, Frankfurt, Federal Republic of Germany.* To evaluate the part of reduced erythropoietin (Ep) production in the pathogenesis of dialysis anemia, measurements of erythropoietin serum activity (S Ep) by means of highly sensitive *in vitro* bioassay (mouse fetal liver cell culture) were performed in 85 nonnephrectomized, nontransfused, chronic hemodialysis patients. In 45 patients (group A), S Ep was lower than the mean of 120 mU/ml of 30 healthy controls. In 40 patients (group B), S Ep ranged from 120 to 380 mU/ml and was outside the range of 500 to 1000 mU/ml established for 20 nonrenal patients with comparable degree of anemia. Group A showed a highly significant positive correlation between S Ep and Hct ($r = +0.48$, $P < 0.001$) as did 13 anephric patients investigated for comparison. In contrast, group B displayed a highly significant negative correlation between S Ep and Hct ($r = -0.53$, $P < 0.001$). The results demonstrate the existence of two distinctive groups of equal size in regular hemodialysis patients: those with an absolute and those with a relative deficiency of Ep. In the case of the latter, lack of Ep is only a secondary factor in the pathogenesis of anemia, whereas uremic toxicity and blood loss appear to play a primary role.

Hemoglobin-oxygen dissociation curve in patients on regular hemodialysis. *C. Raidis, M. Papadimitriou, P. Metaxas, and D.J. Valtis. Second Propedeutic Department of Medicine, Aristotelian University of Thessaloniki, Greece.* The investigation of the changes of the hemoglobin-oxygen dissociation curve (HbO_2) on severely anemic patients with CRF on RDT needs to be expanded if some of the postdialytic symptoms (wash-out syndrome, etc.) are to be explained. Seven patients on regular hemodialysis were studied in 20 dialyses, and seven normal subjects were used as controls. Dialysis was performed every three to four days for 11 hours using a Kiil dialyzer. The HbO_2 dissociation curve and the factors which influence its position were studied before and after each session. Hb showed a lower than normal affinity to O_2 in the uremic patients before hemodialysis (P50, *in vivo* = 33.09 ± 0.92 mm Hg; and P50, 7.4 = 31.51 ± 0.73 mm Hg, $P < 0.001$), and considered as a biological counterbalance against tissue anemic anoxia. After dialysis, HbO_2 affinity even not changed *in vitro* (pH 7.4), increased significantly under the patient's pH (P50, *in vivo* = 27.97 ± 0.57 mm Hg, $P < 0.001$). This probably eliminates the benefits of the predialysis balance of tissue oxygenation, producing a degree of hypoxia, and plays a role in the genesis of wash-out syndrome. It is obvious that the measures should be taken for better oxygenation of high risk patients with latent heart failure or respiratory disturbances during and after the dialysis session.

Monitoring and modulation of recipient immune responsiveness to prevent rejection in early post-transplant period in kidney graft. *E. Renna, P. Sansonetti, C. Nesci, A. Famulair, and R. Cortesini. Cattedra di Chirurgia Sperimentale, University of Rome, C.N.R., Rome, Italy.* In 41 consecutive living and cadaver donor renal transplant recipients, immunologic monitoring was performed two to three times a week for the first two post-transplant months. Monitoring consisted of *1)* circulating T and B cell levels (E-EAC Rosette assay), *2)* T cell reactivity (PHA-Con A), *3)* MLC reac-

tivity, *4)* CML and ADCC reactivity. Rejection was diagnosed by standard techniques, including radioisotope renal scans and biopsy in some cases. Immunosuppression consisted of prednisone, imuran, cyclophosphamide, and horse ALG. In 32 rejection episodes in the first two months, 22 (68%) were associated with a rise in T cells. Rejection activity also correlated with PHA mitogenesis count, augmented of 20 ± 5%. There was no positive correlation between Con A mitogenesis and rejection. There was also no correlation between rejection and circulating B cell levels. MLC reactivity showed correlation with early rejection There was no significant correlation between a positive ADCC and graft rejection. Furthermore, a positive ADCC in association with a negative CML resulted in excellent long graft function. *Conclusion.* An excellent correlation of levels of circulating T cells and T cell reactivity with early *in vivo* rejection was shown.

Binding of antibiotics by dialysis membranes and its clinical relevance. *K.W. Rumpf, J. Rieger, R. Ansorg, B. Doht, F. Scheler. University Hospital, Department of Internal Medicine, 3400 Göttingen, Federal Republic of Germany.* Elimination of commonly used antibiotics (ampicillin, doxycyclin, gentamicin) through dialysis membranes was measured during routine hemofiltration treatment in patients with chronic renal failure and in *in vitro* experiments. Ampicillin showed a constant filtrate/plasma (F/P)-concentration ratio, as would be expected. Gentamicin and doxycyclin, however, exhibited low F/P ratios which increased lineraly with time. *In vitro* experiments showed that this unexpected phenomenon depends on binding of these drugs within the dialysis membranes. The observation of linearly increasing F/P ratios in the *in vivo* studies could be explained by "trapping" of the drugs in the membranes, followed by an "overflow" caused by increasing saturation of the binding capacity of the membranes. The binding of antibiotics to dialysis membranes is shown to be of clinical relevance, since it could be demonstrated that different dialysis membranes have a large binding capacity of up to 0.4 mg/cm² for gentamicin, for example. It is concluded that the elimination of drugs during hemofiltration cannot be estimated by filtrate concentrations alone: binding of drugs to dialysis membranes has to be considered and dose schedules have to be adjusted to the considerable loss of some drugs within the membranes.

The importance of HLA-matching on primary cadaveric kidney transplantation in Gothenburg. *L. Sandberg, I. Blohme, H. Brynger, A. Lindholm, and L.-E. Gelin. Department of Surgery I and Blood Centre, Sahlgren's Hospital, University of Göteborg, Sweden.* The purpose of the investigation was to study the influence of the different serologically defined series of HLA-antigens on the outcome of cadaveric kidney transplantation in a single center material. 349 consecutive, primary, cadaveric kidney transplantations, performed between March, 1969, and April, 1976, were studied. The annual graft survival was unchanged during the period, i.e. 50% at 9 months in spite of the fact that the distribution of "well-matched" kidneys was very uneven. It was found that the prognosis for comparable match-grates was significantly improved during the period and that foreign antigens belonging to the HLA-B series reduced graft survival more than foreign antigens in the A and C series.

Clinical experience with hemodiafiltration. *H. Schneider, E. Streicher, H. Hachmann, H. Chmiel, H.V. Mylius. Department of Nephrology and Hypertension, Katharinenhospital Stuttgart, West Germany.* Six patients were selected because of uncontrollable hypertension (4) and hyperlipidemia (2) for a hemodiafiltration program. They were treated two to ten months, three times weekly. Forty-eight times we used a new capillary aromatic polyamid-membrane, 300 times the RP6 membrane. Medium diafiltration volume was 60 ml/min, resp. 20,98 liters for one treatment. The diafiltrate was continuously substituted, volume-identically, by a modified Ringer-Lactat solution. In comparison to conventional dialyzers, we found higher clearances for larger molecules like uric acid (67.6 ml/min), anorg. phosphate (64.4 ml/min), inulin (60.4 ml/min). The capillary membrane had a significantly lower clearance for inulin (32.1 ml/min). The amino acid loss in a single procedure was 3.22 g ($N = 5$). We could observe a normalization of amino acid pattern during a six-month treatment. Middle molecules were obtained in diafiltrate in a larger amount at the start of the treatment. After six months peak 7 nearly disappeared. In three of four cases severe hypertension markedly improved. In both cases, hyperlipidemia with triglyceride levels of about 1160 mg/100 ml and 550 mg/100 ml, respectively, normalized in a range of two months. According to our preliminary experience, hemodiafiltration has an advantage in severe hypertension and hyperlipidemia.

Effect of recipient variables on graft survival: A study of the fate of pairs of cadaver kidneys. *N.H. Selwood. EDTA Registration Committee and U.K. Transplant, England.* Survival data collected by the EDTA Registration Committee has been linked to donor information recorded by U.K. Transplant (N.O.M.D.S.) by forming an "interface" between the two registries. The joint registry data has been used to study the fate of 477 pairs of cadaver kidneys grafted in 1975 and 1976. Kidneys from the same donor share premortem events and therefore provide controlled material against which to evaluate the effect of recipient parameters. In this study, graft survival has been related to: *1)* age of recipient at time of grafting, *2)* length of dialysis prior to grafting, *3)* clinical status of the recipient at the time of grafting as reflected in the rehabilitation status. (Detailed results cannot be given since the computer data will only be available shortly before the congress.)

Computer use in management of dialysis and transplant patients. *S.V. Shah, N.W. Levin, S. Parnell, B. Hughes, Henry Ford Hospital, Detroit, Michigan.* An efficient computerized system has been developed for a large dialysis and transplant program. The programs, written in a user- (parameter) oriented language (DATA-SHARE), are supported by a DATAPOINT 5500 series minicomputer. The system is flexible, allowing new data definitions to be added at any time. Input from lab results and 30 input forms are used to generate seven output reports each for dialysis and transplant patients. Attributes of the system include: *1)* A physician often has to rely on his memory for management decisions because the present medical record is cumbersome, disorganized, and fails to display pertinent data in a time-oriented sequence. The computer will gather information from several sources (e.g., dialysis forms, lab results, x-rays) and display it in a unified time-oriented format. *2)* Transfer of patients from one facility to another, each with different physicians, makes transmission of pertinent information essential. Terminals at various locations allow immediate access to information gathered at other sites. *3)* The retrieval and analysis of data in large hemodialysis and transplant units are difficult and time-consuming tasks. The system can retrieve data easily on groups selected on any basis (e.g., age, BP, dialyzer type) and perform extensive statistical analysis. *4)* A data base of attributes of potential diagnostic significance can be accumulated for later decision analysis. The system has potential for improving patient care and for clinical investigation, but the cost-benefit ratio needs to be established.

Efficiency of automated reuse of disposable dialyzers. *J.M. Vandenbroucke, A. Stragier, C. van Ypersele de Strihou. University of Louvain Medical School, Leuven, Belgium.* We have devised an equipment for the automated reuse of disposable dialyzers (RP6 and GAMBRO MAJOR GM) and have investigated the effect of reuse on dialyzer efficiency and patient tolerance. RP6 dialyzers are rinsed and sterilized with sodium hypochlorite, 10%, GM dialyzers are rinsed with sodium hypochlorite, 10%, and sterilized in formalin, 4%. *In vitro* dialysances (D) of urea, creatinine, glucose, and inulin were measured in new ($N = 6$) and in ten-times-reused ($N = 21$) RP6 dialyzers. No significant difference was observed. Similar results were obtained in GM ($N = 8$) after seven reuses. *In vivo* D of urea and creatinine were measured in GM ($N = 10$) during the 1st and 7th dialysis: no difference was noted. Efficiency of reuse depends critically on the delay between end of dialysis and rinsing: when delay exceeded 30 min, D dropped over 30% in GM reused

seven times ($N = 10$). Tolerance was excellent: only 1/23 patients had a transient loin pain. By contrast, two patients on RP6 complained of peribuccal paresthesias only when a new dialyzer was used but not on subsequent reuse. Incidence of anti-N antibodies (< 10%) was not higher than in a comparable group of patients treated without reuse. It is concluded that automated dialyzer reuse does not decrease dialyzer efficiency and is well tolerated both clinically and immunologically. The procedure is not time consuming and results in an important money saving.

Kidney graft rejection episode (RE): Time-relationship, prognostic significance and role in infection (I). *P. Vereerstraeten, P. Kinaert, E. Dupont, J.P. De Coninck, J. Van Geertruyden, C. Toussaint. Hôpital Universitaire Brugmann, Brussels, Belgium.* From 1965 to 1976, 622 RE, graded according to Williams, were documented in 255 (232 cadaveric) transplants (220 recipients). The risk of RE, per patient-month, decreases from 85% in the 1st month to 3% after the 1st postoperative (PO) year. Cumulative risk of irreversible (grade 5) RE is 19% for 1st and 33% for 2nd grafts during the 1st PO trimester, but the risk is identical (4%) for both in the ensuing period. Cumulative risk of reversible (grade 0 to 4) RE is 96% for 1st and 67% for 2nd grafts in the 1st PO trimester, but this difference decreases (31 and 21%) afterwards. Chronic (grade 3) RE incidence increases after 1st grafts while 2nd grafts do not demonstrate this time-relationship. Patient and graft survivals are related to RE grade occurring in the 1st PO month: three-year survivals are 75 and 69% for grade 0, 70 and 45% for grade 1, 39 and 31% for grade 2, 42 and 10% for grade 3. The risk of I decreases from 87% at one month to 7% at one year post-transplant. Calculation of risk for I to occur within the month following RE yields the following rates: 0 to 24% for skin mycoses, herpes zoster, upper respiratory and non-specific intestinal I; 25 to 49% for hepatitis, urinary salmonellosis, skin and lung bacterial I; 50 to 74% for herpes simplex, intestinal salmonellosis, bacteremias, non-specific urinary I, Pn. Carinii lung I and CNS involvements; 75% for oral and visceral mycoses.

Iron therapy in hemodialysis patients: Oral or parenteral? *R.J. Winney, C.P. Swainson, A. Parker, J.M. Bone, and J.S. Robson. Medical Renal Unit, University Department of Medicine and Department of Haematology, Royal Infirmary, Edinburgh, Scotland.* There is still controversy regarding the route by which iron supplementation should be given to hemodialysis (IH) patients (pts). 28 pts, established on IH twice weekly, were randomly allocated to one of two treatment groups: *group 1)* Slow Fe. 320 mg oral daily; *group 2)* Imferon, 50 mg i.v. once weekly on dialysis. Pts were assessed before and after 12 months of treatment, but reassessment was made earlier in some pts if other aspects of treatment were altered. A significant rise ($P < 0.02$) in both hemoglobin (Hb) and hematocrit (Hct) occurred with treatment in both groups and there was no significant difference between the responses in the two groups. A rise to normal Hb occurred in two pts in each group. There was no correlation between serum Fe, TIBC, or marrow iron stores, and the change in Hb. or Hct. in either group. Over the period of study, blood transfusion was required in only three pts.

	Oral iron		i.v. iron	
	Hb	Hct	Hb	Hct
Initial	6.8 ± 1.1	20.9 ± 3.4	6.1 ± 1.4	18.8 ± 4.8
After 12 mos.	8.4 ± 2.5	25.8 ± 7.5	7.5 ± 2.3	23.2 ± 7.2
		(mean ± SEM)		

This study demonstrates that a significant rise in Hb, occasionally to normal levels, can be achieved as effectively with oral as with i.v. iron supplementation.